NON-PUBLIC?: N
ACCESSION #: 8902070184
LICENSEE EVENT REPORT (LER)

FACILITY NAME: South Texas Unit 1 PAGE: 1 OF 3

DOCKET NUMBER: 05000498

TITLE: Reactor trip on January 3, 1989 Due to Turbine Controller Failure
EVENT DATE: 01/03/89 LER #: 89-001-00 REPORT DATE: 02/02/89

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50,73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Charles A. Ayala - TELEPHONE: 512-972-8628
Supervising Licensing Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: B SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE TO NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

At 1317 hours on January 3, 1989 with Unit 1 in Mode 1 at 100% power, a reactor trip occurred on over temperature/delta temperature as a result of a failure in the main turbine generator electro-hydraulic control (EHC) system which closed the turbine governor valves. The most probable cause of this event was determined to be a poorly crimped lug on an interconnecting wire which supplied power to several frames of printed circuit cards in the EHC cabinet. This resulted in a high resistance connection which dropped the power supply voltage to several cards which contain digital and analog circuits responsible for control of turbine valves, turbine protection and operator interface. Corrective actions include replacement of the defective wire and check of other similar wires for excessive voltage drop.

END OF ABSTRACT

TEXT PAGE 2 OF 3

DESCRIPTION OF OCCURRENCE:

At 1317 hours on January 3, 1989 with Unit 1 in Mode 1 at 100% power, a reactor trip occurred on over temperature/delta temperature signals generated in two of four reactor coolant loops as a result of a failure in the main turbine-generator electro-hydraulic control (EHC) system which closed the turbine governor valves. Approximately 2.5 seconds prior to the reactor trip, both pressurizer power operated relief valves (PORVs) opened, but closed immediately upon reactor trip. A turbine trip signal was generated by the reactor trip. All steam generator PORVs opened as required, the auxiliary feedwater system actuated on low-low steam generator levels, a main feedwater isolation occurred on low reactor coolant system (RCS) average temperature, and steam generator levels remained within the narrow range indication. No other Engineered Safety Features (ESF) actuations occurred during this event. An acoustic monitor indicated that one of the pressurizer safety valves had opened, but an investigation concluded that the acoustic alarm occurred as a result of one of the pressurizer PORVs opening as described above, due to the extreme sensitivity of the acoustic sensor. Other parameters and equipment responded as expected and operations personnel stabilized the plant. The NRC was notified of the reactor trip at approximately 1516 hours on January 3, 1989.

On January 2, 1989, the EHC controller had been placed in manual mode due to erratic operation and maintenance personnel began troubleshooting activities. At the time of the reactor trip, an I&C technician was monitoring a digital logic signal with a digital voltmeter. This activity was initially thought to have induced the inadvertent governor valve closure. However, subsequent testing using a static simulator to approximate on-line conditions failed to produce a similar response when the same digital logic signal was monitored using the same digital voltmeter. No response was observed which could have caused the governor valve closures. Further troubleshooting revealed low power supply voltage on six of eight printed circuit card frames. An interconnecting wire between the second and third card frames which supplies power to the six card frames with low voltage showed visible signs of overheating and was replaced, correcting the low voltage condition. The cause of the burned power supply wire was an improperly crimped lug by the vendor. One printed circuit card failed and was replaced after the wire was replaced, but no correlation between the burned wire and the failed printed circuit card was determined. No heating of the power supply wires on the card frames has since been noted. Unit 1 was returned to power operation on January 5, 1989, and no erratic operation similar to the January 2, 1989 conditions has occurred. A vendor representative assisting with the investigation stated that low power supply voltage on the six card frames could cause unpredictable results in the digital logic circuits. The six card frames contain digital and analog circuits which control the turbine valves and operator interface, and include protection circuits (such as overspeed protection) which can close the governor valves.

CAUSE OF OCCURRENCE:

The reactor trip was caused by over temperature/delta temperature in two of four reactor coolant loops as a result of a failure of the turbine-generator electro-hydraulic control system. The exact cause of the elctrohydraulic control system failure could not be determined, but was attributed to a degraded interconnecting wire which dropped the power supply voltage to six printed circuit card frames and resulted in spurious signals in the digital logic circuits.

ANALYSIS OF EVENT:

Unplanned reactor protection system actuation is reportable under 10CFR50.73(a)(2)(iv). The reactor tripped as required and plant equipment operated as expected. No unexpected post-trip transients occurred and there was no safety injection actuation. There were no adverse radiological or safety consequences as a result of this event.

CORRECTIVE ACTION:

The following corrective actions are being taken as a result of this event:

1. The power supply interconnecting wire which had burned was replaced with a new wire.

2. The other power supply wires were checked for excessive voltage drop. No other findings were identified.

ADDITIONAL INFORMATION:

No similar events have been reported at the South Texas Project.

The Light
company P.O. Box 1700 Houston, Texas 77001 (713) 228-9211
Houston Lighting& Power

February 2, 1989
ST-HL-AE-2966
File No.: G26
10CFR50.73

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project Electric Generating Station
Unit 1
Docket No. STN 50-498
Licensee Event Report 89-001
Regarding A Reactor Trip on January 3, 1989

Pursuant to 1OCFR50.73, Houston Lighting & Power (HL&P) submits the attached Licensee Event Report 89-001 regarding a reactor trip on January 3, 1989. This event did not have any adverse impact on the health and safety of the public.

If you should have any questions on this matter, please contact Mr. C. A. Ayala at (512) 972-8628.

G. E. Vaughn
Vice President
Nuclear Plant Operations

GEV/BEM/nl

Attachment: LER 89-001

NL.LER89001.U1 A Subsidiary of Houston Industries Incorporated

ATTACHMENT 1 TO 8902070184 PAGE 2 OF 2

Houston Lighting & Power Company

ST-HL-AE-2966
File No.: G26
Page 2
cc:

Regional Administrator, Region IV Rufus S. Scott
Nuclear Regulatory Commission Associate General Counsel
611 Ryan Plaza Drive, Suite 1000 Houston Lighting & Power Company
Arlington, TX 76011 P. O. Box 1700
Houston, TX 77001
George Dick, Project Manager
U. S. Nuclear Regulatory Commission INPO
Washington, DC 20555 Records Center
1100 Circle 75 Parkway

Jack E. Bess Atlanta, Ga. 30339-3064
Senior Resident Inspector-Unit 1
c/o U. S. Nuclear Regulatory Commission Dr. Joseph M. Hendrie
P. O. Box 910 50 Bellport Lane
Bay City, TX 77414 Bellport, NY 11713

J. I. Tapia
Senior Resident Inspector-Unit 2
c/o U. S. Nuclear Regulatory Commission
P. O. Box 910
Bay City, TX 77414

J. R. Newman, Esquire
Newman & Holtzinger, F.C.
1615 L Street, N.W.
Washington, DC 20036

R. L. Range/R. P. Verret
Central Power & Light Company
P. O. Box 2121
Corpus Christi, TX 78403

R. John Miner (2 copies)
Chief Operating Officer
City of Austin Electric Utility
721 Barton Springs Road
Austin, TX 78704

R. J. Costello/M. T. Hardt
City Public Service Board
P. O. Box 1771
San Antonio, TX 78296

Revised 12/21/88
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